

Research in Progress

Construction & Materials Best Practice for Concrete Sidewalks

Research Need

Rapid deterioration of concrete sidewalks has been observed after only a few cycles of freezing and thawing. The causes for this rapid deterioration are not fully known but are believed to be caused by a combination of effects including materials, concrete mixtures, and construction practices.

Goals/Objectives

This project seeks to accomplish the following objectives:

1. Determine best construction practices that result in durable concrete sidewalks. These include concrete placement activities, finishing procedure and time, and curing method (moist cure, chemical cure, no cure).
2. Identify the best performing materials (concrete mixture designs) that contribute to durability. The use of deicing chemicals for sidewalk treatment in response to winter storm events is also included among the variables studied.
3. Identify the factors that contribute to decreased durability of concrete sidewalks through a combination of laboratory testing of hardened concrete (scaling resistance, petrographic analysis, air void structure analysis, and chloride content) and photographic documentation conducted at the site.

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Project Information

This project is being conducted as part of the Massachusetts Department of Transportation (MassDOT) Research Program with funding from Federal Highway Administration (FHWA) State Planning and Research (SPR) funds.

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Performing Organization:

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Project Champion:

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Project Start Date:

October 2019

Expected Project Completion Date:

March 2021

Methodology

This collaborative project involves industry partners, academia, and MassDOT personnel. Concrete sidewalks constructed using six different concrete mixtures were placed at the MassDOT Research and Materials Laboratory. Different sidewalk panels were cast using two different finishing practices and three different curing methods, and were subjected to two different winter treatment methods. Concrete samples were obtained during sidewalk placement to determine the scaling resistance, to subject hardened concrete cylinders to petrographic analysis and air void structure analysis. In addition, chloride ingress analysis will also be performed in concrete cores taken from the sidewalk panels when deterioration is observed. These analysis will complement photographic documentation taken periodically at the site.

